

ENV190/100: Introduction to Environmental Science
From Ecological and Sociological Perspectives

Instructor: Dr. Yoshitaka Kumagai (Office: C4)

Office Hours: Tue & Thurs. 3:30 pm –5:00 pm or by appointment

Contact Information: ykumagai@aiu.ac.jp

Style of Class: Lecture

Credits: 3

Course Description:

This course is designed to introduce students to the basics of environmental science with emphasis on ecological and sociological perspectives. Environmental science is a multidisciplinary subject consisting of various fields, such as physics, chemistry, biology, geology, meteorology, sociology, political science, etc. For instance, understanding the global warming issue requires not only understanding the physical and chemical mechanisms of global warming but also understanding the interconnectedness of global warming with such as the conflicts between industrialized and developing countries, globalization, the value judgments which various cultures adopt, technological innovations, and the various life styles of people in various societies. It is important to understand that an understanding of the basics of the natural sciences is necessary to understand the relationships between causes and effects involved in various environmental issues, whereas an understanding of the social sciences is integral to understanding why these issues occur, and how they should be addressed, improved or resolved.

Objectives:

After completing this class, students are expected to understand 1) basic components and mechanism of ecosystems; 2) the basic scientific principles underlying environmental issues; (3) how various human activities impact the earth and why environmental issues have recently become so important; (4) the technologies associated with the major environmental issues and the technologies that may help resolve these problems; (5) the sociological factors influencing the environmental issues, and 6) understanding how sustainable environmental management practices should be developed.

Class Materials:

- “Living in the environment 15th edition” By Tyler Miller Jr. Thomson, Brooks/Cole
- Lecture Handouts can be downloaded from <http://www.intra.aiu.ac.jp/~kumagai/>

Grading Components:

Class Participation (20%) ^{Note1}

1 Presentation with a handout (10%) ^{Note2}

A report on field trip(s) (10%)

4 Quizzes (20%)

Midterm Exam: (20 %)

Final Exam: (20%)

Grading Criteria

A: 90-100%

- B: 80-89%
- C: 70-79%
- D: 60-69%
- F: Less than 60%

Note 1: Students may be allowed to miss up to two class sessions. After that students lose 2 % out of 20% per absence.

Note 2: Presentation topic will be assigned one week prior to a presentation date. Students are expected to use a Power Point for his/her presentation. The grade of presentation will be judged based upon the evaluations scored by Dr. Kumagai.

Class Schedule:

Each class will be carried out based on the reading assignment. Lectures will be given using various visual aids, such as Power Point presentations and videos. Informal discussion will be held during each class, in which the students and a professor will discuss the content of the lecture and various questions prepared by the professor.

Week 1: Introduction

- Syllabus Review
- Overview of the class

Week 2: Introduction (cont.)

- Living More Sustainably
- Population Growth, Economic Growth, and Economic Development
- Resources
- Environmental Problems: Causes and Connections
- Cultural Changes and the Environment

Reading Assignment: Chap. 1

Week 3: Ecosystems: What They Are and How Do They Work

- The Nature of Ecology
- The Earth's Life Support Systems
- Ecosystem Components
- Energy Flow in Ecosystems
- Quiz 1**

Reading Assignment: Chap. 3

Week 4: Evolution and Biodiversity

- Origins of Life
- Evolution, Natural Selection, and Adaptation
- Geologic Process, Climate Change, Catastrophes, and Evolution
- Ecological Niches and Adaptation
- Speciation, Extinction, and Biodiversity
- Genetic Engineering and the Future of Evolution

Reading Assignment: Chap.4

Week 5: Community Ecology

- Community Structure and Species Adaptation

Types of Species
Species Interactions: Competition and Predation
Species Interactions: Parasitism, Mutualism, and Commensalism
Ecological Succession: Communities in Transition
Ecological Stability and Sustainability

Reading Assignment: Chap. 7

Week 6: Population Ecology

Population Dynamics and Carrying Capacity
Reproductive Patterns

Quiz 2

Reading Assignment: Chap. 8

Week 7: Sustaining Biodiversity: The species approach

Species Extinction
Importance of Wild Species
Habitat Loss, Degradation, and Fragmentation
Invasive Species
Population Growth, Pollution, and Climate Change

Reading Assignment: Chap.11

Week 8: Food, Soil Conservation, and Pest Management

Food Security and Nutrition
Food Production
Soil Erosion and Degradation
Sustainable Agriculture through Soil Conservation
The Green Revolution and Its Environmental Impact
The Gene Revolution

Midterm Exam

Reading Assignment: Chap.13

Week 9: Water

Water's Importance, Availability, and Renewal
Too Little Fresh Water
Withdrawing Groundwater to Increase Supplies
Using Dams and Reservoirs to Supply More Water
Desalting Seawater, Seeding Clouds, and Towing Icebergs and Giant Baggies
Too Much Water
Solutions: Using Water More Sustainably

Reading Assignment: Chap.14

Week 10: Energy Efficiency and Renewable Energy

Reducing Energy Waste and Improving Energy Efficiency

Ways to Improve Energy Efficiency
Using Renewable Solar Energy to Provide Heat and Electricity
Producing Electricity from the Water Cycle, Wind, and Biomass

Quiz 3

Field Trip

Reading Assignment: Chap.17

Week 11: Climate Change and Ozone Depletion

Past Climate Change and the Greenhouse Effect
Climate Change and Human Activities
Factors Affecting the Earth's Temperature
Effects of Global Warming
Dealing with Global Warming
What is done to Reduce Greenhouse Gas Emissions?

Reading Assignment: Chap.20

Week 12: Solid and Hazardous Waste

Wasting Resources
Integrated Waste Management
Reuse
Recycling
Burning and Burying Solid Waste

Field Trip

Reading Assignment: Chap.22

Week 13: Economics, Environment, and Sustainability

Economic Systems and Sustainability
Valuing Ecological Services and Monitoring Environmental Progress
Economic Tools for Improving Environmental Quality
Making the Transition to More Environmentally Sustainable Economics

Quiz 4

Reading Assignment: Chap.24

Week 14 and 15: Backup, Special Lectures, and Review/Integration